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Lawrence Livermore National Laboratory Emergency Response Capability 2009 Baseline Needs Assessment Performance Assessment

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Emergency Response Capability 2009 Baseline Needs Assessment

Performance Assessment



Lawrence Livermore National Laboratory

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**Emergency Response Capability
BASELINE NEEDS ASSESSMENT
Performance Assessment**

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December 2009


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1.0 Introduction and Executive Summary

1.1 Introduction

This document was prepared by John A. Sharpy, LLNL Fire Marshal and Division Leader for Fire Protection and was reviewed by Sandia/CA Fire Marshal, Martin Gresho. This document is the second of a two-part analysis of Emergency Response Capabilities of Lawrence Livermore National Laboratory. The first part, 2009 Baseline Needs Assessment Requirements Document established the minimum performance criteria necessary to meet mandatory requirements. This second part analyses the performance of Lawrence Livermore Laboratory Emergency Management Department to the contents of the Requirements Document.

The document was prepared based on an extensive review of information contained in the 2004 BNA, a review of Emergency Planning Hazards Assessments, a review of building construction, occupancy, fire protection features, dispatch records, LLNL alarm system records, fire department training records, and fire department policies and procedures.

On October 1, 2007, LLNL contracted with the Alameda County Fire Department to provide emergency response services. The level of service called for in that contract is the same level of service as was provided by the LLNL Fire Department prior to that date. This Compliance Assessment will evaluate fire department services beginning October 1, 2008 as provided by the Alameda County Fire Department.

1.2 Executive Summary – Performance Assessment

1.2.1 Performance Status – Manual Firefighting LLNL Site 200

Table 1.2.1 Performance Status Summary Manual Firefighting Site 200

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
Structure Fire	1 st Unit	4	380	90 %	Met
	1 st Alarm	5	620		
Wildland Fire	Fire Attack	4	440	90%	Met
	1 st Alarm	1	620		

1.2.1.1 Observations – Manual Firefighting LLNL Site 200

None

1.2.2 Performance Status Manual Firefighting – Site 300

Table 1.2.2 Performance Status Summary – Fire Response S-300

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Performance Criterion Met or Not Met
GSA Area Structure Fire	1 st Unit 1 st Alarm	4 5	380 sec. 1800 sec.	90 %	Met
Non GSA Area Structure Fire	1 st Unit 1 st Alarm	4 5	960 sec. 2760 sec.	90 %	Met
Wildland Fire	Fire Attack 1 st Alarm	4 1	1020 sec. 2760 sec.	90%	Met

1.2.2.1 Observations – Manual Firefighting Site 300

None

1.2.3 Performance Status – Emergency Medical Service

Table 1.2.3 Performance Status Summary -- EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time	Performance Criteria	Performance Criterion Met or Not Met
All EMS Except Non GSA Site 300	1 st Responder Transport	1 ALS 2 BLS	480 sec.	90%	Met
EMS Non GSA Site 300	1 st Responder Transport	1 ALS 2 BLS	900 sec.	90%	Met

1.2.3.1 Observations – Emergency Medical Service

None

1.2.4 Performance Status – Hazardous Materials

Table 1.2.4 Performance Status Summary -- HAZMAT

Staffing	Training Level	Performance Criterion	Performance Criterion Met or Not Met
Investigation Level Incident			
4	Trained Personnel 380 sec. Response time	90%	Met
Level I Incident Site 200 only			
12	Trained Personnel 680 sec. Response time	90%	Met
Level II Incident Site 200 Only			
17	Trained Personnel		Met

1.2.4.1 Observations – Hazardous Materials

None

1.2.5 Performance Status – Technical Rescue

Table 1.2.5 Performance Status Summary – Technical Rescue

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
S-200, Sandia/CA S-300 GSA Area Technical Rescue	1 st Unit	4	380 sec.	90%	Met
	1 st Alarm	5	1800 sec.	90%	Met
Non GSA Area Technical Rescue	1 st Unit	4	960 sec.	90 %	Met
	Alarm	5	2760 sec.	90 %	Met

1.2.5.1 Observations – Technical Rescue

None

1.2.6 Performance Status -- Emergency Communications

Table 1.2.6 Performance Status Summary – Emergency Communications

Event	Time Criteria	Performance	Criterion Met or Not Met
Dispatcher training	N/A	NFPA 1061	Met
Answer 911 phone	15 seconds	95%	Met
	40 seconds	99%	Met
Acknowledge alarm	15 seconds	95%	Not Met (69%)
	40 seconds	99%	Not Met (82%)
Dispatch emergency	60 seconds	95%	Not Met (89%)
	90 seconds	99%	Not Met (96%)
Lab Alarms transmit alarms to ACRECC	45 seconds	95%	Met
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%	Not Evaluated
Dispatch emergency	60 seconds	95%	Not Met (89%)
	90 seconds	99%	Not Met (96%)

1.2.6.1 Observations – Emergency Communications

1. ACRECC could improve time performance on dispatch and alarm acknowledgement times. One means of improving alarm acknowledgment times is to have the alarms received by the LLNL fire alarm system on the “Fire” screen automatically dump into the CAD system creating a “waiting call” for dispatch.

2. ACRECC should update all policies and procedures to have a consistent and current ACRECC format.
3. Sandia/CA could improve emergency alarms processing time by having the LLNL fire alarm system be their primary system, reporting all information directly to the system rather than have the CAS operator call with detailed information.
4. Sandia/CA could improve the processing time for emergencies reported by telephone by having those calls answered direct at ACRECC rather than having the Sandia/CA CAS relay the information to ACRECC.

1.2.7 Performance Status – Training and Certification

Table 1.2.7 Performance Status Summary - Training

Personnel	Performance Measure	Performance Criterion Met or Not Met
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.	Met
Entry level	There is an established training criterion for minimum performance of entry-level personnel.	Met
Incumbents	There is an established on-going training criterion for training for incumbents.	Met
Officers	There is a minimum training criteria established for fire officers or supervisors of emergency responder.	Met
Special Operations	There is a minimum training criteria established for special operations such as hazardous materials and technical rescue.	Met
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.	Met
All	Documented training records exist for each individual.	Met

1.2.7.1 Observations – Training and Certification

None

1.2.8 Performance Status – Pre-Fire Plans

Table 1.2.8 Performance Status Summary– Pre-Fire Plans

Performance Measure	Frequency	Performance Criterion Met or Not Met
Provide pre-fire plans for all buildings	Annually	Met Needs Improvement
Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Annually	Met Needs Improvement
Emergency Call Out Lists and Special Information Sheets are updated by ES&H Teams.	Quarterly	Met

1.2.8.1 Observations – Pre-Fire Plans

1. Run Card drawings could be improved by including a legend of symbols and ensuring all required building features are shown.
2. Emergency Call Out Lists and Special Information Sheets could be improved by proper quarterly review.

1.2.9 Performance Status – Emergency Response Apparatus

Table 1.2.9 Performance Status Required First Line & Reserve Apparatus

Type Apparatus	Number	Comment	Criterion Met or Not Met
Engine	3	Livermore Site – 2, S-300 – 1	Met
Aerial Ladder	1	Livermore Site	Met
Ambulance	2	Livermore Site – 1, S-300 – 1	Met
Type 3 Engine	2	Livermore Site – 1, S-300 – 1	Met
Type 4 Engine	2	Livermore Site – 1, S-300 – 1	Met
Hazardous Materials	1	Responds both sites	Met
Command	1	Battalion Chief	Met Provided by ACFD
Reserve Type 1 Engine	1	1 Reserve per 5 in front-line service	Not Met
Reserve Ambulance	1	1 Reserve per 5 in front-line service	Met
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service	Not Met Provided by ACFD

Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service	Met
Apparatus Plan		Written 5 year Plan	Met
Apparatus Maintenance		Per NFPA and GSA Fleet Requirements	Met

1.2.9.1 Observations – Emergency Apparatus

1. Replacement of the oldest ambulance is necessary to maintain a reserve ambulance capability, a capability that ACFD does not maintain.
2. Internally, LLNL should resolve the philosophy under which it will operate the emergency vehicle fleet. Does LLNL want to have the ability to “stand alone” during a large area emergency? Is the use of ACFD reserve apparatus an acceptable risk?

2.0 Purpose

The purpose of this document is to compare the actual response capabilities of Lawrence Livermore National Laboratory to the minimum performance criteria established in the 2009 Baseline Needs Assessment Requirements Document.

3.0 Scope

This compliance assessment covers the following items as developed by the Baseline Needs Assessment Requirements Document.:

- Response to fire emergencies
- Response to medical emergencies
- Response to hazardous materials emergencies
- Response to situations requiring technical rescue
- Emergency communications and dispatch requirements
- Training requirements for emergency responders
- Pre-fire plan requirements including Emergency Planning Hazard Assessments
- Emergency response apparatus
- Other fire protection program components (typically, those requiring fire protection engineering support) are not included.

4.0 Assumptions

This Performance Assessment is prepared based on the 2009 Baseline Needs Assessment Requirements Document. The Baseline Needs Assessment identifies the emergency response taken from applicable regulatory documents (primarily NFPA Codes and Standards) and modified as needed for application at the LLNL and Sandia/CA sites. The Baseline Needs Assessment defines the criteria used to evaluate compliance of the emergency response capability.

5.0 Emergency Response Organization

5.1 Alameda County Fire Department

The Alameda County Fire Department (ACFD) is a full time fire department was formed on July 1, 1993 as a dependent special district with the Alameda County Board of Supervisors as its governing body. This consolidation brought together into a single jurisdiction the Castro Valley Fire Department, the Eden Fire Department and County Fire Patrol (each a dependent special district under the Board of Supervisors). The department provides all risk service to those unincorporated areas of Alameda County and provides services under contract to the Cities of Dublin and San Leandro as well as Lawrence Berkeley National Laboratory.

Effective October 1, 2007, ACFD was contracted to provide emergency response services for Lawrence Livermore National Laboratory including LLNL's Site 300 and Sandia/CA. In January 2008, ACFD also assumed responsibility for running the Alameda County Regional Emergency Communications Center (ACRECC) and became responsible for monitoring the LLNL Fire and Emergency Voice Alarm System, which included monitoring fire alarms for not only LLNL, but also Sandia/CA, Lawrence Berkeley National Laboratory, and Parks Reserve Training Center.

5.1.1 ACFD Stations and Staffing

ACFD operates 21 fire stations covering approximately 472 square miles in the communities it serves. The LLNL fire stations are numbers 20 and 21 in the county system. Overall, ACFD has 368 fire fighters and officers providing 24/7 coverage which includes 3 Battalions, 21 engine companies, 5 truck companies and specialized equipment such as an Air/Light/Support Unit, a Heavy Rescue Vehicle, a Hazardous Materials Response Vehicle, a 2,500 gallon Water Tender, and a dozer.

ACFD provides three companies at LLNL. Each company has a minimum staffing of a Captain and three fire fighters. In addition to fire fighter qualifications, all company members are Emergency Medical Technicians with one being a Paramedic. At Station 20, which serves LLNL Site 200 and the Sandia/CA campus, there are two companies. Station 20 companies are required to be HazMat Companies, meaning that all members of these companies are required to have Hazardous Materials Technician qualifications with the Captain having Hazardous Materials Specialist qualifications.

Upon award of the contract for emergency services, ACFD absorbed all current LLNL fire fighters into their organization so there was no break in service, qualifications, or level of security clearance. All fire fighters permanently assigned to LLNL possess a DOE security clearance and, in addition, 69 ACFD members in other stations have security clearances and qualifications to work at LLNL.

Before being able to work at either of the LLNL fire stations an ACFD employee must take a minimum level LLNL site-specific training. After assignment to LLNL on a permanent basis, an ACFD member has six months to take the remaining LLNL specific training. Personnel not assigned to LLNL on a permanent basis are only permitted to fill one of the four positions on any company. In that way, staff temporarily assigned to LLNL, are supported by personnel who are fully LLNL qualified.

The LLNL Battalion Chiefs were absorbed into ACFD and became the chief officers assigned to ACFD Battalion 3. Although they serve all of Battalion 3, they are housed in Station 20 on the LLNL campus.

Since the beginning of the ACFD contract, three of the original LLNL fire fighters and a Battalion Chief have either retired or “bid” another ACFD station. The Battalion Chief’s position was filled with a newly promoted Chief on a permanent basis. The three fire fighter positions are being filled by floaters until a permanent assignment can be made.

5.2 Mutual and Automatic Aid

LLNL, as an entity, is still signatory to several mutual and automatic aid agreements. LLNL meets its obligations to these agreements through its subcontractor, the Alameda County Fire Department. The agreements are as follows:

- Automatic Aid Agreement with the Livermore-Pleasanton Fire Department
- Automatic Aid Agreement with the Alameda County Fire Department
- Alameda County Mutual Aid Agreement
- Tracy Fire Department Mutual Aid Agreement
- Mutual Threat Zone MOU with California Division of Forestry (provides automatic aid for wildland fires at S-300)
- Ambulance Response MOU with American Medical Response
- Mutual Fire Protection Resources Agreement with City of Livermore

5.3 Alarm Monitoring and Emergency Dispatch

From its inception in early 2001, the organization that became the Alameda County Emergency Communications Center (ACRECC) was operated by the LLNL Emergency Management Division and later the Emergency Management Department. Beginning in January 2008, operation of ACRECC was turned over to ACFD and certain alarm monitoring and emergency activities became part of the contract between ACFD and LLNL. Included in those services are monitoring the LLNL fire alarm system, which includes alarms being received from Sandia/CA, Lawrence Berkeley National Laboratory, and Parks Army Training Center. In addition, ACRECC is responsible for the following functions and operations:

- Answering emergency telephone calls.
- Dispatching emergency fire and emergency medical apparatus via station alerting systems and radio for LLNL and Sandia National Laboratory.
- Monitoring and responding to active fire alarms for LLNL and Sandia National Lab.
- Tracking emergency and non-emergency response resources via radio and telephone.
- Providing emergency pager notification for deaf employees.
- Making Emergency Alert System announcements for Site 200 and 300.
- Participating in facility and site drills and exercises as required by DOE Order 151.1.C.
- Coordinating emergency response with LLNL and Sandia National Laboratory Protective Force personnel.

6.0 Analysis of Services Provided

6.1 Manual Fire Suppression – LLNL Site 200

6.1.1 Minimum Performance Measure – LLNL S-200

The level of emergency response is based on the potential hazard presented. The hazard level presented can be grouped into two basic categories, sprinklered building and non-sprinklered buildings. Based on the provisions of NFPA 1710 and the above rationale regarding the level of protection provided, the following minimum performance measures are derived:

Structure Fire

Respond to alarms in buildings with an initial alarm assignment of one engine company (minimum staff of 4) to provide for arrival within 380 seconds Total Response Time 90% of the time and provide for the arrival of the rest of the alarm assignment within a Total Response Time of 620 seconds 90% of the time.

Wildland Fire

Respond to a reported wildland fire within a Total Response Time for a two-flank wildland fire attack of 440 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 620 seconds 90% of the time.

6.1.2 Performance Summary – Manual Fire Fighting LLNL Site 200

Table 6.1.2 Performance Summary – Manual Fire Fighting Site 200

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
Structure Fire	1 st Unit Battalion Chief	4 1	380 620	90 %
Wildland Fire	Fire Attack Battalion Chief	4 1	440 620	90%

6.1.3 Services Provided – Manual Fire Fighting LLNL Site 200

ACFD provides LLNL with minimum on-duty staffing at Fire Station 20 (LLNL Site 200) of nine persons (2 Captains, 6 Fire Fighters, and 1 Battalion Chief). That staffing is sufficient to provide the minimum response to buildings protected by automatic sprinklers.

For fires in unprotected structures, which represent about 40% of the structures on LLNL property, but only 10% of the building area, the Fire Department at LLNL does not have sufficient resources to meet the minimum initial attack criteria.

Because of the 2004 LLNL BNA, the response schedule was changed to automatically dispatch three companies to non-sprinklered building fires. After awarding of the contract to ACFD the LLNL response schedule was changed to match the ACFD schedule, which calls for three engines, one truck, and a Battalion Chief for a reported fire in any building.

To determine compliance with the Total Response Time criterion, dispatch records for 18 months were examined. Disallowing any incident with incomplete or inconsistent information, 392 incidents were evaluated for response time. The result is that all three performance criterion are met.

6.1.4 Performance Status -- Manual Firefighting LLNL Site 200

Table 6.1.4 Performance Status Summary – Manual Firefighting Site 200

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
Structure Fire	1 st Unit	4	380	90 %	Met
	1 st Alarm	1	620		
Wildland Fire	Fire Attack	4	440	90%	Met
	First Alarm	1	620		

6.1.5 Observations – Manual Firefighting Site 200

None

6.2 Manual Fire Suppression – Site 300

6.2.1 Minimum Performance Measure – Site 300

Based on the provisions of NFPA 1710 and the above rationale, the following minimum performance measures are derived:

GSA Buildings

Respond to alarms in buildings with sprinkler protection within the General Services Area of Site 300 with a alarm assignment of one engine company (minimum staff of 4) to provide for arrival within a Total Response Time of 380 seconds 90% of the time and provide for the arrival of the remainder of the first alarm within a Total Response Time of 1800 seconds 90% of the time.

Outside of GSA Buildings

Respond to fire incidents outside of the general services area with an alarm assignment of one engine company to provide for arrival within a Total Response Time of 960 seconds 90% of the time and provide for the arrival of the remainder of the first alarm assignment within a Total Response Time of 2760 seconds 90% of the time.

Wildland Fires

Respond to a reported wildland fire at Site 300 within a Total Response Time for a two-flank wildland fire attack of 1020 seconds 90% of the time and provide for the arrival of a Battalion Chief within a Total Response Time of 2760 seconds 90% of the time.

6.2.2 Performance Summary – Manual Firefighting Site 300

Table 6.2.2 Performance Summary – Manual Firefighting S-300

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
GSA Area Fire	1 st Unit Battalion Chief	4 1	380 sec. 1800 sec.	90 %
GSA Area Fire Non-sprinklered Bldg	1 st Unit 1 st Alarm	4 13	380 sec. 1800 sec.	90 %
Non GSA Area Fire Sprinklered Bldg	1 st Unit 1 st Alarm	4 1	960 sec. 2760 sec.	90 %
Non GSA Area Fire Non-sprinklered Bldg	1 st Unit 1 st Alarm	4 13	960 sec. 2760 sec.	90 %
Wildland Fire	Fire Attack Battalion Chief	4 1	1020 sec. 2760 sec.	90%

6.2.3 Services Provided – Manual Fire Fighting Site 300

ACFD has minimum on-duty staffing at Fire Station 21 (Site 300) of four persons (1 Captain, 3 Fire Fighters). An engine company and chief officer are dispatched from the Livermore Site on every fire response, but with an extended arrival time due to travel distance.

The rural nature of Site 300 dictates specialized tactics for structure fires in order to meet provisions of the various requirement documents concerning the 2In/2Out fire fighter safety requirement. If an interior structural fire as defined within the OSHA regulation and NFPA 1500 is encountered, the first arriving engine company will perform other functions such as, rescue, treatment of the injured, establishment of a water supply, stretch hose lines in preparation for fire attack, and protect exposures until the arrival of the second engine company. In concert with the OSHA rule and NFPA 1500 requirements, a rescue attempt can be made before the arrival of the second engine company if an imminent life-threatening situation is encountered.ⁱ

Considering the remote location of Site 300, and considering that many of buildings at Site 300 outside of the GSA area will require a 30-minute cooling off period prior to any entry, the fire incident response plan and tactical plan is appropriate, meets the intent of the requirement documents and meets the minimum response criteria established in the Baseline Needs Assessment.

Wildland fire control at Site 300 is a hazard that is mitigated significantly by the annual prescribed burn. The prescribed burn confines a potential fire to the property

boundaries of Site 300, eliminates the fuel in high fire probability areas (high explosive test areas), and generally breaks the fuel path, thereby limiting the size of potential fires in other areas. The Fire Department has been successfully conducting prescribed burns at Site 300 for over 40 years. Two documents describe and regulate the prescribed burns, the *Site 300 Explosive Test Facility Prescribed Burn/Smoke Management Plan*ⁱⁱ and EMD Procedure 1606, *Tactical Plan-Command Procedures: Controlled Burns at Site 300*.ⁱⁱⁱ

Because of the prescribed burn process, fire fighters assigned to Station 21 are well trained and experienced with “back-fire” techniques and use that technique extensively as a fire control measure when responding to wildland fires at Site 300. Staffing at Station 21 allows a standard two-flank attack. LLNL fire fighters have a history of aggressive wildland fire attack at Site 300 and control most fires with the initial response. As with all fire incidents, additional equipment is dispatched from the Livermore Site, but with an extended arrival time. Wildland fires beyond the capabilities of the initial fire attack are usually held in check by the prescribed burn boundaries, but LLNL’s Mutual Threat Zone Agreement with the CAL Fire allows for specialized resources such as fire fighting helicopters and tankers in addition to normal wildland mutual aid.

Response statistics for the past eighteen months indicate a continued very low response rate for Site 300. T.

The Fire Department also supports the community surrounding Site 300 by providing fire response to the areas immediately adjacent to Site 300 property, an area with no recognized fire department. During the past three calendar years, off-site fire responses totaled 73 with the average being 24 per year.

The ACFD wildland fire incident response plan and tactical plan is appropriate and meets the minimum response criteria established in this assessment.

6.2.4 Performance Status – Manual Firefighting Site 300

Table 6.2.4 Performance Status Summary – Fire Response Site 300

Type Incident	Responder	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Performance Criterion Met or Not Met
Structure Fire GSA Area	1 st Unit 1 st Alarm	4 5	380 sec. 1800 sec.	90 %	Met
Structure Fire Non GSA Area	1 st Unit 1 st Alarm	4 5	960 sec. 2760 sec.	90 %	Met
Wildland Fire	Fire Attack 1st Alarm	4 1	1020 sec. 2760 sec.	90%	Met

6.2.5 Observations – Manual Firefighting Site 300

None

6.3 Emergency Medical Service

6.3.1 Minimum Performance Measure – EMS

Based on the requirements of NFPA 1710 and the Alameda County EMS Agency, the minimum performance measure is established as follows:

Site 200, Sandia/CA, GSA Area of S-300

Arrive on scene of an EMS incident on the at Site 200, Sandia/CA, or the GSA Area of S-300 with first responder/transport ALS capability of one ALS and two BLS qualified responders within a response time of 480 seconds 90% of the time.

Outside of GSA Area of S-300

Arrive on the scene of an EMS incident Outside of the GSA Area of Site 300 with first responder/transport ALS capability of one ALS and two BLS qualified responders within a Total Response Time of 2,100 seconds 90% of the time.

6.3.2 Performance Summary -- EMS

Table 7.5.3 Performance Summary -- EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time
All EMS Except Non GSA Site 300	1 st Responder/Transport	1 ALS 2 BLS	480 sec.
EMS Non GSA Site 300	1 st Responder/Transport	1 ALS 2 BLS	900 sec.

6.3.3 Services Provided – EMS

ACFD staffs every company with one ALS qualified fire fighter. All fire fighters are BLS qualified as Emergency Medical Technician 1 with the transport or ambulance training module.

All LLNL ambulances are ALS qualified. LLNL responds each engine company as a first responder ALS unit; thus, each engine is equipped with the necessary ALS equipment and drugs.

Fire Station 20 houses a first line ambulance and the reserve ambulance. The reserve ambulance is equipped and maintained as a first response unit and can immediately be used for a second or simultaneous ambulance response. As with fire responses, a unit is dispatched from the Livermore site to any response at Site 300. In this case, an ambulance will respond from Fire Station 20 to any EMS call at Site 300 to assist, provide back-up, and if necessary cover-in at Station 2.

6.3.4 Performance Status Summary -- EMS

Table 6.3.4 Performance Status Summary -- EMS

Type Incident	Responders	Minimum Staffing (persons)	Response Time	Performance Criteria	Performance Criterion Met or Not Met
All EMS Except Non GSA Site 300	1 st Responder Transport	1 ALS 2 BLS	480 sec.	90%	Met
EMS Non GSA Site 300	1 st Responder Transport	1 ALS 2 BLS	900 sec.	90%	Met

6.3.5 Observations – Emergency Medical Service

None

6.4 Hazardous Materials

6.4.1 Minimum Performance Measure – HazMat

Provide initial response to a hazardous materials incident at Site 200, Sandia/CA, and the Site 300 General Services Areas to arrive within a Total Response Time of 380 seconds 90% of the time and provide for a Level One response at Site 200 within a Total Response Time of 680 seconds 90% of the time.

Provide sufficient personnel trained to the proper level for a Level I or Level II hazardous materials incident prior to beginning any operations activities.

6.4.2 Performance Summary -- HAZMAT

Table 7.6.4 Performance Summary -- HAZMAT

Task	Staffing	Training Level
Investigation Level Incident		
Incident Commander	1	Hazmat IC & Technician
HazMat Group	3	Awareness
Total	4	380 sec. 90% of the time
Level I Incident Site 200 Only		
Incident Commander	1	Hazmat IC & Specialist
Safety and Tech Reference	2	HM Safety and Technician
HazMat Group	7	Technician
Medical Group	2	Operations & EMT
Total	12	
Level II Incident Site 200 Only		
Incident Commander	1	Hazmat IC & Specialist
Safety and Tech Reference	3	Specialists & Technicians
HazMat Group	9	Technician & Operations
Time Recorder & Access Control	2	Operations
Medical Group	2	Operations and EMT
Total	17	

6.4.3 Services Provided -- HazMat

The contract with ACFD provides that Station 20 is a HazMat station and all fire fighters assigned to that station are certified Hazardous Materials Technicians and all Officers be certified Hazardous Materials Specialists. Station 21 does not require that constant level of staffing because of the general lack of hazardous materials.

Station 20 can handle an initial level and most Level 1 incidents with on-duty staffing. Full-blown hazardous materials incidents require significant equipment and staffing resources. The Fire Department on-duty staffing at LLNL, like most local agencies, does not have the capability to respond to a large hazardous materials incident without mutual aid assistance. LLNL and ACFD have developed a regional approach to hazardous materials response utilizing the County Mutual Aid Plan response to large hazardous materials incidents.

While the LLNL is able to maintain the equipment it has, it does not have the funds to update and upgrade to the newest technology equipment. Without future continued funding for equipment, LLNL's hazardous materials response will be hampered by lack of the most current equipment and will have to depend upon mutual aid and the resources of the Alameda County Fire Department. During the past twenty-four months, LLNL has had to call in the resources of ACFD to deal with spills of unknown materials that could have been handled locally, if the LLNL owned apparatus had been equipped with the most modern equipment. This undermines the LLNL historical desire to be able to "stand alone" in the event of a large area disaster.

Considering the unique combination of security concerns and hazardous materials present, LLNL should be apprehensive about the ability of the Fire Department to provide the necessary response capability without adequate funding for hazardous materials equipment.

The LLNL Fire Department can meet the minimum response criteria contained in the Baseline Needs Assessment by a combination of on duty staffing and use of mutual aid.

6.4.4 Performance Status Summary – HazMat

Table 7.6.4 Performance Status Summary -- HAZMAT

Staffing	Training Level	Performance Criterion	Performance Criterion Met or Not Met
Investigation Level Incident			
4	Trained Personnel 380 sec. Response time	90%	Met
Level I Incident Site 200 Only			
12	Trained Personnel 680 sec Response time	90%	Met
Level II Incident Site 200 Only			
17	Trained Personnel		Met

6.4.5 Observations – HazMat

None

6.5 Technical Rescue

6.5.1 Performance Requirements – Technical Rescue

Based on the requirements of OSHA 29CFR1910.120, 29CFR1910.146, and NFPA 1670, the minimum performance measure for a Technical Rescue incident is established as follows:

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents at Site 200, Sandia/CA, and the GSA Area of Site 300 within a total response time of 360 seconds for an Operational Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents at Site 200, Sandia/CA, and the GSA Area of Site 300 within a total response time of 600 seconds for a Technician Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents in the Outside of the GSA Areas of S-300 within a total response time of 960 seconds for an Operational Level Incident 90% of the time.

Respond to reported technical rescue incidents to provide rescue and extrication of victims of structural collapse, vehicle accidents, and construction accidents or confined space accidents in the Outside of the GSA Areas of S-300 within a total response time of 2760 seconds for a Technician Level Incident 90% of the time.

6.5.2 Performance Summary – Technical Rescue

Table 6.5.2 Performance Summary – Technical Rescue

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria
S-200, Sandia/CA GSA Area S-300 Technical Rescue	1 st Unit	4	380 sec.	90%
	Remainder of 1 st Alarm	5	1800 sec.	90%
Non GSA Area Technical Rescue	1 st Unit	4	960 sec.	90 %
	Remainder of 1 st Alarm	5	2760 sec.	90 %

6.5.3 Services Provided – Technical Rescue

The LLNL Fire Department responds to all technical rescue incidents on LLNL and Sandia property.

The Engine Company responds to known technical rescue incidents. The engine company is provided with a hydraulic rescue tool (often called the “jaws of life” by the media), cribbing, and air rescue bags (heavy duty air inflatable bags used to lift or move heavy objects). If the incident were identified as a confined space incident, the HazMat vehicle would also respond, since it carries the specialized confined space rescue equipment.

The performance criterion is met for both staffing and time. There were no technical rescue incidents in the data for the past 18 months, but response times for other incidents indicate that criterion will be met.

Although the Fire Department meets the minimum response criteria for this item, LLNL suffers from the same syndrome here as in hazardous materials responses. That is, lack of adequate budget for updating tools and equipment.

6.5.4 Performance Status Summary – Technical Rescue

Table 6.5.2 Performance Summary – Technical Rescue

Type Incident	Responders	Minimum Staffing (persons)	Total Response Time	Performance Criteria	Criterion Met or Not Met
S-200, Sandia/CA S-300 GSA Area Technical Rescue	1 st Unit	4	380 sec.	90%	Met
	1 st Alarm	5	1800 sec.	90%	Met
Non GSA Area Technical Rescue	1 st Unit	4	960 sec.	90 %	Met
	Alarm	5	2760 sec.	90 %	Met

6.5.5 Observations – Technical Rescue

None

6.6 Emergency Communications

6.6.1 Minimum Performance Requirements

Based on the above analysis the minimum performance measures for Emergency Communications are as follows:

ACRECC shall provide evidence that their dispatch staff is trained to meet the qualifications of NFPA 1061 and is capable of meeting the provisions of Section 7.2 of NFPA 1221.

ACRECC shall provide evidence that alarms received, via telephone or alarms from LLNL’s site-wide alarm system, are answered or in the case of signals from the alarm system, acknowledged, within 15 seconds 95 % of the time and within 40 seconds 99% of the time.

ACRECC shall provide evidence that LLNL alarms are dispatched within 60 seconds 95% of the time and within 90 seconds 99% of the time.

Lab Alarms shall provide evidence that alarms are transmitted to ACRECC for dispatch within 45 seconds of receipt by Lab Alarms 95% of the time. ACRECC and/ Lab Alarms will notify the appropriate party within 10 minutes of a supervisory or trouble alarm 95% of the time to allow for response of appropriate personnel.

6.6.2 Performance Summary – Emergency Communications

Table 6.4.3 Performance Summary – Emergency Communications

Event	Time Criterion	Performance
Dispatcher training	N/A	NFPA 1061
ACRECC Answer or Acknowledge Alarm	15 seconds 40 seconds	95% 99%
ACRECC Dispatch Emergency	60 seconds 90 seconds	95% 99%
Lab Alarms transmit alarms to ACRECC	45 seconds	95%
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%

6.6.3 Services Provided – Emergency Communications

LLNL monitors its fire alarm system through the LLNL Fire and Emergency Voice (FEVA) system. Alarms are transmitted via supervised telephone lines to the central processor where the alarms are processed and passed on to the Alameda County Regional Emergency Communications Center (ACRECC) for dispatch. During normal working hours (Monday through Friday 0700 hrs until 1700 hrs) the LLNL Lab Alarms desk screens alarms, with active alarms passed onto to ACRECC for dispatching. During off hours, ACRECC performs the monitoring function.

ACRECC dispatched 50,193 for consortium members during the last year. Staffing varies somewhat by season with a minimum of 4 dispatchers on duty during winter months and a minimum of 5 during wildland season. Dispatchers receive 3 weeks of classroom training and approximately 4 months of one-on-one on the job training. All dispatchers received 48 hours of continuing training annually. This training is equal to the training provisions of NFPA 1061, *Standard for Professional Qualifications for Public Safety Telecommunicator*.

The dispatch center records all telephone and radio communications and retains those recordings for 100 days. Instant payback recorders are provided at each dispatch console. Fire alarm data is recorded by LLNL as part of their alarm system. Dispatch records are computerized and all information retained in electronic format. Fire apparatus in the ACRECC system use vehicle mounted laptops to communicate with the dispatch center for recording enroute times, on-scene times, and when available. Alarms are acknowledged by electronics means from each station. The center is provided with redundant emergency generators and has dispatch equipment on redundant Uninterruptable Power Supplies. ALCO Fire uses the Alameda County 800 MHz

trunking radio system, but responses at LLNL are operated on a federal government 400 MHz trunking system. Both systems are redundant in the dispatch center.

ACRECC has a comprehensive set of operating procedures, including several that are unique to dispatching and handling of alarms. While the set of procedures is comprehensive, many of the procedures are carry-overs from the time when the dispatch center was operated by the LLNL Fire Department. When viewed, these procedures bring into question their current status. For consistency, all procedures should be brought updated to be on ACRECC forms and reviewed for current practices.

The dispatch center is operated in accordance with the operational chapters of NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications System*, including the performance requirements for call handling. A review of the dispatch data for LLNL incidents indicates the following performance to the performance criteria of NFPA 1221:

88.9% of LLNL alarms are dispatched within 60 seconds

96.3% of LLNL alarms are dispatched with 90 seconds

Data for telephone call answering was not readily available but is reported to be within the performance criteria. Dispatch records for the 18 months reviewed are not always complete in regards to company response and on-scene times. This is partially due to the transition to the new CAD system while waiting for laptop computers installation in fire apparatus. The previous CAD system automatically entered these times via a radio system push button. The laptop computers are to replacement for the radio system logging system, but lagged behind CAD installation slightly. This caused ACRECC dispatchers to have to log the information manually, causing some inaccurate times and in some cases causing missing data. Upon installation of the laptop computers, the time logging was again accomplished automatically. To determine dispatch hold times the data from LLNL incidents was analyzed only for those incidents in which there was complete data. Where there were anomalies in times, those incidents were excluded. This limited the number of incidents, but still provided a solid set of data for analysis.

A review of alarm data from the LLNL Alarm System records indicated that acknowledgement times for fire alarms were 69% within 15 seconds, 82% within 40 seconds, and 91% within 60 seconds. This performance is very good, but could be improved by having alarms received by the alarm system “Fire” screen automatically dump into the CAD system creating a “waiting call” to be dispatched.

Alarms from Sandia/CA are simultaneously routed to the Sandia Central Alarm Station (CAS) simultaneously with the LLNL alarm system, however, the data sent to the LLNL system is not complete for all building systems. The Sandia/CA CAS follows-up each alarm with a phone call to ACRECC to confirm receipt of the alarm and provide the additional information. The Sandia/CA emergency phone number is also answered in the CAS, information taken and then passed on to ACRECC for dispatch. Both of these situations cause delay in the dispatching of emergency forces, which is unnecessary. Further, the training of the Sandia/CA CAS operators is reported to be less than that required for ACRECC, an issue that may be critical during an emergency call. Sandia/CA should consider having all alarm information come directly to the LLNL

system to avoid delays in alarm processing. Similarly, emergency calls from Sandia should be answered by the properly trained dispatchers at ACRECC rather than at the Sandia/CA CAS. The system can be arranged to allow CAS to monitor the calls and take over the call if it is not fire or emergency medically related.

6.6.4 Performance Status – Emergency Communications

Table 6.4.4 Performance Status Summary – Emergency Communications

Event	Time Criteria	Performance	Criterion Met or Not Met
Dispatcher training	N/A	NFPA 1061	Met
Answer 911 phone	15 seconds 40 seconds	95% 99%	Met Met
Acknowledge alarm	15 seconds 40 seconds	95% 99%	Not Met (69%) Not Met (82%)
Dispatch emergency	60 seconds 90 seconds	95% 99%	Not Met (89%) Not Met (96%)
Lab Alarms transmit alarms to ACRECC	45 seconds	95%	Met
ACRECC and/or Lab Alarms Notify Appropriate Party of Supervisory or Trouble Alarm	600 seconds	95%	Not Evaluated
Dispatch emergency	60 seconds 90 seconds	95% 99%	Not Met (89%) Not Met (96%)

6.6.5 Observations – Emergency Communications

1. ACRECC could improve time performance on dispatch and alarm acknowledgement times. One means of improving alarm acknowledgment times is to have the alarms received by the LLNL fire alarm system on the “Fire” screen automatically dump into the CAD system creating a “waiting call” for dispatch.
2. ACRECC should update all policies and procedures to have a consistent and current ACRECC format.
3. Sandia/CA could improve emergency alarms processing time by having the LLNL fire alarm system as their primary system, reporting all information directly to the system rather than have the CAS operator call with detailed information.
4. Sandia/CA could improve the processing time for emergencies reported by telephone by having those calls answered direct at ACRECC rather than having the Sandia/CA CAS relay the information to ACRECC.

6.7 Training and Certification

6.7.1 Minimum Performance Requirements -- Training

Based on the above requirement and analysis the minimum performance measures for Training are as follows:

Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.

There is an established training criterion for minimum performance of entry level personnel.

There is an established on-going training criterion for training for incumbents.

There is a minimum training criteria established for fire officers or supervisors of emergency responder.

There is a minimum training criteria established for special operations such as hazardous materials and technical rescue.

There is an established program of drills and exercises at various facilities on LLNL site.

There are documented training records exist for each individual.

6.7.2 Performance Summary – Training

Table 6.5.2 Performance Summary - Training

Personnel	Performance Measure
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.
Entry level	There is an established training criterion for minimum performance of entry-level personnel.
Incumbents	There is an established on-going training criterion for training for incumbents.
Officers	There is a minimum training criteria established for fire officers or supervisors of emergency responder.
Special Operations	There is a minimum training criteria established for special operations such as hazardous materials and technical rescue.
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.
All	Documented training records exist for each individual.

6.7.3 Services Provided -- Training

ALCO Fire has multiple training policies and standards, which are generally included in the 50.000 series of Official Action Guides (OAGs). As part of the ALCO Fire Recruit Academy, there is a minimum set of standards for entry level firefighter which includes two year probation. These standards are documented in the ALCO OAGs.

There are also standards for wildland firefighting, which are part of the “red card” program. It is reported that the training includes ICS 100, S-130 (Firefighter Training), S-190 (Introduction to Fire Wildland Behavior), L-180 (Potential Hazards and Human Factors on the Fire line) and S-131 (Advanced Firefighter Training). These are all part of the Recruit Academy. These standards are documented in the ALCO OAGs..

A recurring training program was established in 2006 to provide a minimum of 20 hours of refresher training and an assessment tool for all ALCO fire stations. A copy of OAG 50.009 and the 2008 and 2009 Training Plans was submitted as evidence of a recurring training plan. The training plans are comprehensive with study guides, performance evaluations, and monthly training assignments.

Minimum qualifications for company officers include being a member of ALCO Fire for 5 years, completion of a Task Book for Captain, completion of Command 1, Instructor 1A from the State Fire Marshal’s Office, and completion of ICS 300. There is an Officer Academy and a 1-year probationary period.

There is a training program for hazardous materials and technical rescue training for those personnel in stations requiring that training. This training is documented in the ALCO OAGs.

Drills and exercises at LLNL facilities is an important part of the emergency management program. There are extensive drills and exercises of various types are scheduled throughout the year by the Emergency Programs Division of the Emergency Management Department. Special facility familiarization tours are conducted annually for all nuclear facilities. Any special fire fighting techniques for these facilities are discussed at that time. The Emergency Programs Division maintains documentation of the drills.

Training is tracked for each individual via a computer program that is part of the ALCO records management system. A sample of individual training records was examined. Each record contained the module completed, number of hours, and date. The Training Office does certification tracking.

6.7.4 Performance Status -- Training

Table 6.5.4 Performance Status Summary - Training

Personnel	Performance Measure	Performance Criterion Met or Not Met
Entry level	Qualifications are established for entry-level fire department personnel that include medical and physical performance criteria.	Met
Entry level	There is an established training criterion for minimum performance of entry-level personnel.	Met
Incumbents	There is an established on-going training criterion for training for incumbents.	Met
Officers	Criteria established a minimum training for fire officers or supervisors of emergency responder.	Met
Special Operations	Criteria established a minimum training for special operations such as hazardous materials and technical rescue.	Met
Drills and Exercises	There is an established program of drills and exercises at various facilities on LLNL site.	Met
All	Documented training records exist for each individual.	Met

6.7.5 Observations – Training

None

6.8 Pre-Fire Plans

6.8.1 Minimum Performance Requirements – Pre-Fire Plans

The performance criteria for Pre-Fire Plans are as follows:

Provide pre-fire plans for all LLNL and Sandia/CA buildings meeting LLNL Procedure 310.00 with an annual review frequency to ensure that they are current and accurate.

Provide and maintain written standard operating procedures for emergency response to occupancies with hazardous materials or other unique hazards.

6.8.2 Performance Summary – Pre-Fire Plans

Table 6.8.2 Performance Summary – Pre-Fire Plans

Performance Measure	Frequency
Provide pre-fire plans for all buildings	Annual
Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Review Annually Update as Needed
Ensure that Emergency Call Out Lists and Special Information Sheets are updated by ES&H Teams.	Quarterly

6.8.3 Services Provided – Pre-Fire Plans

ACFD provides Pre-Fire Plans based on a LLNL Fire Department Procedure, 310.00 Training and Building Run Cards. The LLNL Procedure has been re-issued as an ACFD Policy, Policy 30-103.

LLNL run cards consist of hanging folders that contain building plans, alarm and sprinkler zone plans, exposure maps, an emergency call out list, and a Special Information Sheet. This provides a detailed description of the contents of the building, ways to approach it, and the layout of the building and alarm zones. The “run cards” are filed in building number order in a filing cabinet in the apparatus room. Mutual and automatic aid companies have been shown the location of the run cards in case they are responding to a building without one of the “resident” companies.

The Special Information Sheets and the Emergency Call Out Lists are maintained by the ES&H Teams and updated quarterly. Information is loaded onto a server and downloaded quarterly by the Emergency Management Department Secretary.

A recent audit and observations by the Fire Marshal in the past six months have found areas for improvement of the run cards. Some of the drawings in the run cards do not show all the items required and some of the run cards do not contain a legend of the symbols. Emergency Call Out lists have not been updated per the required schedule.

6.8.4 Performance Status – Pre-Fire Plans

Table 8.8.2 Performance Status Summary– Pre-Fire Plans

Performance Measure	Frequency	Performance Criterion Met or Not Met
Provide pre-fire plans for all buildings	Annually	Met Needs Improvement

Provide written standard operating procedures for response to occupancies with hazardous materials or other unique hazards	Annually	Met Needs Improvement
Emergency Call Out Lists and Special Information Sheets are updated by ES&H Teams.	Quarterly	Met

6.8.5 Observations – Pre-Fire Plans

1. Run Card drawings could be improved by including a legend of symbols and ensuring all required building features are shown.
2. Emergency Call Out Lists and Special Information Sheets could be improved by proper quarterly review.

6.9 Emergency Response Apparatus

6.9.1 Minimum Performance Requirements – Emergency Apparatus

Provide the following apparatus for use by the Fire Department at LLNL:

Type Apparatus	Number	Comment
Engine	3	Livermore Site – 2, S-300 – 1
Aerial Ladder	1	Livermore Site
Ambulance ALS Configuration	2	Livermore Site – 1, S-300 – 1
Type 3 Engine	2	Livermore Site – 1, S-300 – 1
Type 4 Engine	2	Livermore Site – 1, S-300 – 1
Hazardous Materials	1	Responds both sites
Command	1	Battalion Chief
Reserve Type 1 Engine	1	1 Reserve per 5 in front-line service
Reserve Ambulance	1	1 Reserve per 5 in front-line service
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service
Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service

Apparatus and equipment must meet NFPA Standards for design, minimum equipment, and maintenance.

Provide a written replacement schedule for all emergency apparatus to allow timely replacement.

6.9.2 Performance Summary – Emergency Apparatus

Provide the following apparatus for use by the Fire Department at LLNL:

Type Apparatus	Number	Comment
Engine	3	Livermore Site – 2, S-300 – 1
Aerial Ladder	1	Livermore Site
Ambulance ALS Configuration	2	Livermore Site – 1, S-300 – 1
Type 3 Engine	2	Livermore Site – 1, S-300 – 1
Type 4 Engine	2	Livermore Site – 1, S-300 – 1
Hazardous Materials	1	Responds both sites
Command	1	Battalion Chief
Reserve Type 1 Engine	1	1 Reserve per 5 in front-line service
Reserve Ambulance	1	1 Reserve per 5 in front-line service
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service
Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service

6.9.3 Services Provided – Emergency Apparatus

As part of the contract with ACFD, LLNL remains responsible for providing emergency apparatus and equipment. ACFD is responsible for replacement of expendables. The LLNL emergency apparatus fleet is modern, well designed, complying with NFPA standards and is maintained per the GSA maintenance schedule. The oldest vehicle in the fleet of fire apparatus is just ten years old. One ambulance is 20 years old, but will be replacement this year.

The design of the fleet is such that the reserve engine is being used as the first line Type 1 Engine for Station 21. ACFD has provided coverage for engines out of service due to repairs and maintenance, however, the LLNL fleet does not meet minimum requirements for first line and reserve apparatus. LLNL has always desired to be able to “stand alone” in the event of a large area emergency. The lack of a reserve engine does not allow that philosophy to be maintained. Operationally over the past 25 months, with the support of ACFD, the reserve engine situation has been covered.

There is a five-year apparatus replacement plan. The next major replacement vehicle is due in 2013 with T-20 being the target for a 15-year replacement.

6.9.4 Performance Status – Emergency Apparatus

Table 6.7.4 Performance Status Required First Line & Reserve Apparatus

Type Apparatus	Number	Comment	Criterion Met or Not Met
Engine	3	Livermore Site – 2, S-300 – 1	Met
Aerial Ladder	1	Livermore Site	Met
Ambulance	2	Livermore Site – 1, S-300 – 1	Met
Type 3 Engine	2	Livermore Site – 1, S-300 – 1	Met
Type 4 Engine	2	Livermore Site – 1,	Met

		S-300 – 1	
Hazardous Materials	1	Responds both sites	Met
Command	1	Battalion Chief	Met Provided by ACFD
Reserve Type 1 Engine	1	1 Reserve per 5 in front-line service	Not Met
Reserve Ambulance	1	1 Reserve per 5 in front-line service	Met
Reserve Type 3 Engine	1	1 Reserve per 5 in front-line service	Not Met
Reserve Type 4 Engine	1	1 Reserve per 5 in front-line service	Met
Apparatus Plan		Written 5 year Plan	Met
Apparatus Maintenance		Per NFPA and GSA Fleet Requirements	Met

6.9.5 Observations – Emergency Apparatus

1. Replacement of the oldest ambulance is necessary to maintain a reserve ambulance capability, a capability that ACFD does not maintain.
2. Internally, LLNL should resolve the philosophy under which it will operate the emergency vehicle fleet. Does LLNL want to have the ability to “stand alone” during a large area emergency? Is the use of ACFD reserve apparatus an acceptable risk?

7.0 Biographies of Principal Authors

John A. Sharpy. Mr. Sharpy is the current LLNL Fire Marshal and was the Division Leader for Emergency Management and Fire Chief of Lawrence Livermore National Laboratory from 1981 until his retirement in 2002. Prior to joining LLNL in 1981, Mr. Sharpy held positions as Assistant Director of Engineering Service and Chief Life Safety Code Specialist for the National Fire Protection Association (NFPA). Early in his career Mr. Sharpy served as an field engineer for the National Board of Fire Underwriters and the Fire Insurance Rating Organization of New Jersey, Director of Fire Technology Programs for Delaware Technical and Community College, Fire Investigator for NFPA, Chief Fire Marshal of Prince William County Virginia, and engineering manager positions with Code Consultants Inc. and Hughes Associates, Inc. Mr. Sharpy is a Certified Chief Fire Officer and Fire Prevention Officer. He holds a Bachelor’s Degree (University of Maryland 1970) and is finishing his Master’s Degree in Public Administration (University of Southern California).

Mr. Sharpy has served as Chair of the NFPA Technical Committee on Fire Department Occupational Safety and Health (NFPA 1500), Chair of the Technical Committee on Assembly and Educational Occupancies, and Chair of the Technical Committee on

Residential Occupancies. He has been a member of the Technical Committees on Means of Egress, Fire Department Risk Management, Disaster/Emergency Management and Business Continuity and is currently a member of the Technical Committees on Uniform Fire Code, Residential Occupancies, and alternate member on the Technical Correlating Committee on Fire and Emergency Service Protective Clothing and Equipment. He was honored in 1989 to be named to NFPA Standard Council, a position he held for two consecutive 3 year terms. Mr. Sharry is the author of many articles on fire protection and is the author of the first edition of Life Safety Code Handbook and contributing author to the second through fourth editions of that handbook. He has been a contributing author to many editions of the Fire Protection Handbook and the technical editor and sometime performer in several fire protection educational films.

Mr. Sharry continues as the senior instructor in the NFPA's seminar program. He developed and taught the first Life Safety Code seminar in 1977, a program in which he continues as an instructor. Mr. Sharry also instructs for the NFPA seminars on Fire Protection Equipment Maintenance and Emergency Planning. Mr. Sharry has extensive experience in code enforcement and applications of codes and standards to a variety of occupancies and in developing fire department baseline needs analyses.

Martin Gresho, PE. Mr. Gresho is a registered professional Fire Protection Engineer (CA-1989) with experience in both the nuclear (commercial nuclear power reactors and DOE nuclear facilities) and the commercial sectors of fire protection and code enforcement. Mr. Gresho has performed Fire Hazards Analyses for numerous nuclear facilities. Mr. Gresho serves as the Fire Marshal at Sandia National Laboratory's California site with oversight responsibility for all fire protection systems and code compliance site-wide. Mr. Gresho also serves on several NFPA Technical Committees charged with development of new code (NFPA 2 *Hydrogen* – Chair; NFPA 55 *Industrial and Medical Gases* – Principal; NFPA 400 *Hazardous Materials* – Principal). Mr. Gresho has experience as both a FPE and a Licensing Engineer in the NRC Regulated nuclear power industry. Mr. Gresho has a master's degree in Environmental Engineering (1995) and a Bachelor's Degree in Mechanical Engineering (1985).

ⁱ Emergency Management Division, Policies and Procedures Manual, *Procedure 1609 Tactical Plan-Standard Engine Company Operations*, 23 April 1999.

ⁱⁱ Lawrence Livermore National Laboratory, *Site 300 Explosive Test Facility Prescribed Burn/Smoke Management Plan*, UCRL-AR-154174-REV 1, March 2004.

ⁱⁱⁱ Emergency Management Division, Policies and Procedures Manual, *Procedure 1606 Tactical Plan-Command Procedures: Controlled Burns at Site 300*, 13 October 2000.